

# Fact Sheet

## ICING FORECAST/NOWCAST ENHANCEMENT

### PROBLEM

The National Weather Service (NWS) has replaced most manual weather observations with automated observations made by the Automated Surface Observing System (ASOS). ASOS provides a complete suite of weather observations, including wind speed and direction, temperature, humidity, pressure, visibility, ceiling, and precipitation rate and type. An ice detector indicates that ice is occurring, but provides no other information. This is a problem for NWS Weather Forecast Offices (WFOs) charged with issuing watches and warnings when specific amounts of ice of a given type have accumulated during a storm. The current algorithms in ASOS provide neither ice type nor amount, thus making the issuance of watches and warnings difficult. Icing rates are not available to airport deicing managers who need to judge when to deice aircraft prior to takeoff, and assess the holdover times for anti-iced aircraft. Information on the amount of ice that accumulates through storms for climatological purposes also has been unavailable.

### SOLUTION

ASOS detects ice on a freezing rain sensor, an instrument with which CRREL has considerable experience. CRREL, in partnership with the NWS ASOS Program Office, and Alan Ramsay, a NWS contractor, developed a program in 1995 to measure ice amount and type on standard surfaces, and to develop algorithms allowing the ASOS ice detector signal to be used to compute cumulative ice accretion amounts and icing rates during storms. Ice type is computed by combining the logic of several sensors in the ASOS sensor suite to determine whether the proper conditions exist for frost, rime, freezing rain, or freezing drizzle.

Manual observations of icing are made on "standard" surfaces (rods and plates) to represent electrical power transmission lines, tree limbs, and the flat surfaces of bridges and aircraft wings. Rods and plates are weighed periodically during ice storms, and ice thickness is measured for comparison with ice detector signals. Measurements are made cooperatively by NWS WFOs at Cleveland, Ohio, and Binghamton, New York. Additional observations are made at Sterling, Virginia (Dulles Airport); Johnstown, Pennsylvania; Lebanon, New Hampshire; and at Mount Washington Observatory, New Hampshire.

Algorithms have been developed that reliably provide icing rate and cumulative amount through storms, as well as ice type. A METAR remark has been proposed, conforming to international standards, that will be broadcast by each of the 600 ice-detector-equipped ASOSs nationwide for use by NWS WFOs, value-added weather providers, and the military.

### RESULTS

Four papers have been written and published in proceedings of the American Meteorological Society (AMS) and the International Workshop on Atmospheric Icing of Structures. The NWS Office of Meteorology has proposed a requirement to NWS regions for the METAR remark, which has been accepted by the NWS. Algorithms will be programmed into ASOS within the next few years, making icing amount available nationwide during storms. A paper will be published in the *Bulletin of the AMS* when the METAR remark is activated.

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